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The Impact of Employees' and Managers' Training on the Performance of Small- and Medium-Sized Enterprises: Evidence from a Randomised Natural Experiment in the UK Service Sector*

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Abstract

We investigate the relationship between employees' and managers' training and firm performance using a policy intervention that randomly assigned training support to small- and medium-sized enterprises (SMEs) in the UK accommodation and food service sector. Because the number of firms self-selected into training exceeded available places, training was randomly assigned to some firms, resulting in a randomized natural experimental design that allowed us to identify the average effect of training on treated firms. Our empirical results suggest that employees' training had a stronger positive impact on firms' labour productivity and profitability than that of managers'.

1. Introduction

Economic theory postulates that firms invest in the training of employees, in anticipation of a return in the form of higher productivity and profitability (Becker 1962, 1993). In practice, it has been difficult to estimate the return of investment in training to the employer, mainly because of methodological problems related to omitted variables, measurement error, and reverse causality (Dearden et al. 2006). Addressing these methodological problems so as to isolate the impact of training on firm performance, has been, and remains, a key empirical challenge for studies in the economics and human resource management (HRM) literature (Becker & Huselid 2006; Bloom & Van Reenen 2011; Guest et al. 2003). A fruitful way to progress in this area, suggested by many scholars, is to rely on experimental empirical designs, where training is assigned exogenously (Becker & Huselid 2006; Bloom & Van Reenen 2011)

The few experimental studies purporting to estimate the returns from training to the firm (Bruhn & Zia 2013; Karlan & Udry 2012; Drexler et al. 2010; Karlan & Valdivia 2011; Mano et al. 2012), have mainly focused on the impact of managerial training on the performance of small- and medium-sized enterprises (SMEs) in developing countries (see McKenzie & Woodruff 2012 for a review).

In the context of developed countries, a few recent studies employed experimental or quasi-experimental variation in training participation of employees in order to estimate the impact of training on individual worker performance (De Grip and Sauerman 2012; Leuven & Oosterbeek 2008). However, there is no experimental evidence from developed countries to date, on the link between training and firm performance. Moreover, although some authors make a distinction between the training of managers and non-managerial employees and their relative importance for the firm (Lucas 1978; Storey 2004), there has been no empirical study to our knowledge, that

separately identifies the effect of managers' and non-managerial employees' training on firm performance.

In this paper we address the aforementioned gaps in the literature by leveraging a policy intervention that randomly assigned general training services for managers and for non-managerial employees in a sample of SMEs in the UK accommodation and food service sector. Training support was randomly allocated to some of the firms, as a result of the fact that the number of firms self-selected into training exceeded the number of available places. Under this randomized natural experimental design, participating firms that did not receive training can provide a valid counterfactual of what would have happened to those firms that received training, had they not received it, and allow us to identify the average effect of training on the treated firms.

2. Conceptual Background

Human capital theory postulates that training (either general or specific) increases the productivity of individual workers and hence, ceteris paribus, productivity at the firm, industry and the economy-wide levels (Blundell et al. 1999). Although general training is expected to increase labour productivity at the firm level, the impact of general training on firm profitability will depend on the relative magnitude of training costs and the share of the returns to general training extracted by the firm. That in turn will depend on the degree of firm's labour market power (Acemoglu & Pischke 1998, 1999).

The above predictions do not make a distinction between the impact of general training of managers and non-managers on firm performance, but several studies suggested that these effects are likely to be different (Bruhn et al. 2010, 2012). Managerial human capital, in contrast

to that of non-managers, may impact firm's output and productivity by improving the marginal productivity of managerial inputs but also that of other inputs, such as non-managerial labour and physical capital (Penrose, 1959, Bruhn et al. 2010). Moreover, improvements in managerial human capital are expected to help relax resource constraints, as managers' decisions are shaping the firm's investment strategy, capital structure, and overall business plan (Bennedsen et al. 2007; Bertrand & Schoar 2003). Similarly, the impact of managers' training on firm profitability may be different to that of non-managerial employees. For example, Manning (2003) suggested that there are reasons to believe that the labour market for more skilled workers is less monopsonistic than that for the less-skilled, as a result of the higher profit opportunities for firms, which increase competition between firms and drive up skilled labour wages.

3. The Public Policy Intervention and the Selection of Businesses

a) The Public Policy Intervention

In the UK, the government has placed knowledge and skills at the centre of its strategy to improve the growth capability of UK SMEs and foster national competitiveness and productivity (Small Business Service 2002). As a response to that objective, a number of training initiatives for SMEs have been introduced in the UK over the last decade (OECD 2002; Storey 2004).

One of these initiatives was launched in 2001 by the Department for Business Innovation and Skills (BIS) (formerly known as Department for Trade and Industry (DTI)), with the objective to foster growth, productivity, and performance of SMEs in the accommodation and food service sector (DTI 2004) through the provision of "support services". The initiative that was funded by the BIS was also supported by all trade associations in the sector and was initially expected to support more than 1000 businesses participating in the business support programs.

Support programs targeted key areas of SMEs' weaknesses such as employees' general skills, innovation, marketing, as well as product, and service quality (DTI 2004). In particular, the first wave of support programs provided by BIS were solely engaged in advancing employees' and managers' general skills and the general human capital of participating businesses by providing training services. This is because the lack of skilled workforce was identified as the most important limitation faced by SMEs (Small Business Service 2001; Small Business Service 2002).

The first wave of BIS support programs was implemented between September 2002 and August 2003 and involved three formal[1] training services aiming to upgrade the general human capital of participating SMEs. These services included a training program for non-managerial employees and two training programs for managers. The training program for employees (we label this as the "employees' training" service) aimed to develop the general skills of non-managerial staff and to increase their productivity. The training programs for managers included two programs. One program targeted general managerial skills (we label this the "managers' training" service), aiming at helping owner-managers (Forth et al. 2006) to develop skills and expertise related to the running of the business and decision making. The second program aimed at improving the general HRM skills of managers (we label this the "HRM training" service) by promoting best practice in selection, recruitment, and retention of employees.

Each of the general training services was delivered by certified business consultants onsite and free of charge to the selected businesses, while the duration, intensity, and content of each service was the same for all businesses. In particular, the "employees' training" service included two modules delivered to all non-managerial employees of the business. The first module focused on the delivery of effective and reliable customer service and the second module on

improving business literacy, numeracy, and communications skills. Each module included 4 two-hour sessions and the two modules were delivered interchangeably on a weekly basis (more details on the content of the "employees' training" and the other two training services are available by the authors on request). Training under this service began in September 2002 and lasted 9 weeks to account for one final review session.

Similarly the "managers' training" service was provided to all managerial employees of the business and was organized in three modules: module one was on assertiveness and delegation and comprised two two-hour sessions, module two and three were on financial management, and on developing a business plan respectively and included four two-hour sessions each. The total training time under this service was ten weeks with the three modules being delivered sequentially on a weekly basis starting with module one and followed by modules two and three. The "managers training service" began in January 2003, so as not to run in parallel to the "employees' training" service, as this would place more demands in terms of employees' and managers' time over a shorter time span for those businesses selected to receive both services.

Finally, the "HRM training" service, that began in June 2003 and lasted for eight weeks, was provided to all managerial employees and included four focused two-hour workshops delivered biweekly. This service had as objective to provide a review of business performance in the area of selection, recruitment, and retention of workforce, to present case studies of best practices and offer tips for improvements**.**

b) *The Selection of Businesses*

The procedure for business selection in the BIS business support program and the allocation of training services was as follows: in the first stage businesses were contacted using information

from the yellow pages business data base, employing a stratified randomized procedure. In particular, trade associations in the sector contacted randomly a number of businesses from each UK region, with the number of contacted businesses in each region being proportional to the region's share in the population of SMEs in the sector. All contacted businesses that expressed willingness to participate in the program and had less than 250 employees (hence satisfied the European Commission definition of an SME (European Commission 2002)) were enlisted in the program that involved the provision of all three training services (no record was kept of the contacted firms that were not interested in participating in the program). The process of contacting businesses was completed after a target number of eligible firms willing to participate in the program were reached (for the first wave this target was circa 1350 firms). The target number of firms was based on a rough estimate of the availability of funds provided by the BIS in each UK region. The precise amount of funds allocated to training provision in each region was determined by the BIS after the first stage of business selection.

In the second stage of the program, the allocation of each training service across program-participating businesses was determined by funding availability in the region, with less competitive regions and regions with more program-enlisted firms being allocated more funds. In the case regional funding was not sufficient to provide the training service to all enlisted businesses in the region, the service was allocated by a random lottery. As the number of businesses eligible to receive each training service exceeded the number of businesses that can be supported by the service in all regions, all three training services were randomly assigned within each region. As a result some businesses received all three services, whereas others received a combination of two, one, or none of the services. In particular, 480 businesses received no service, 178 businesses received all three services, while 168, 56, and 20 businesses

received only the "employees' training", the "managers' training", and the "HRM training" service respectively. Moreover, 117 businesses received both the "employees' training" and the "managers' training" service, 14 businesses received the "employees' training" and the "HRM training" service, and 22 businesses received both the "managers' training" and the "HRM training" service.

The random assignment of the training services across businesses forms the key feature of our empirical design to evaluate the impact of the training intervention on the performance of participating businesses.

Compliance with the provision of each service was full, as all firms selected to receive each service took the service and completed the training and no service was provided to any firm not initially selected to receive a service. Generally such a complete take-up and completion of training by all selected businesses is quite rare (Bruhn et al. 2012; Karlan & Valdivia 2011), an exception being Mano et al. (2012). In our case we believe that this can be attributed to the several characteristics of the service provision, such as the involvement of the trade associations and that care was taken to minimize the (real and opportunity) costs to the employees and the business as a whole. In particular, the services were delivered a) free of charge, b) in-house, and c) outside business operation times and at times that were convenient for employees and managers.

4. The Data

The analysis of the impact of each training service on the performance of participating businesses is based on two data sets: one includes information on a few key characteristics of participating businesses just before the implementation of training services in 2002, extracted

from the database of the British hospitality association. The other was from data collected as part of a follow-up survey implemented after the completion of training provision.

The follow-up survey was implemented around two years after the completion of BIS training provision to the selected firms, between November 2005 and February 2006 by the authors of this paper in close collaboration with trade associations of the accommodation and food service sector. The survey included multiple contacts of all program-participating businesses. The first step was to notify businesses about the survey, the second involved mailing the questionnaire and several follow-ups aiming to enhance the response rate (Dillman 1999). The questionnaire included questions on key financial and other performance indicators, as sales revenue, total expenditure and advertising expenditures of the last completed financial year, and on factors determining business performance, as these are informed by theory and from focus groups discussions with CEOs of the trade associations and business owners/managers (the questionnaire is available by the authors on request). The questionnaire was kept short (4 pages) and simple partly because of concerns of a low-response rate and partly because focus groups discussions revealed that in contrast to large firms, the organizational structure of SMEs in the UK accommodation and food service sector is quite simple.

The survey achieved a rather high response rate (32%), as compared to the average response rate for SMEs in this sector (that is less than 20% according to Dillman (1999)), with 430 businesses returning the survey questionnaire. The information collected was of high quality, as the vast majority of managers provided detailed answers to all questions.

Table 1 presents summary statistics of baseline characteristics, obtained from the database of the British hospitality association, for businesses that responded in the follow-up survey and of key business outcomes observed in the follow-up survey. Baseline information on sales revenue and

number of employees was reported in bands, but sales revenue was missing for more than 50 per cent of the businesses and this is why it is not reported. Baseline characteristics suggest that the majority of businesses were small (less than 100 employees), were hotels, restaurants, or pubs, and mostly limited companies located in a rural area. The follow-up survey statistics suggest that two years after the baseline information was collected, the same businesses had on average, around 2 million pounds annual sales revenue, an annual profit margin of 22 percent, and 54 employees.

Insert Table 1 about here

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5. Results

The key feature of the empirical strategy we employ to estimate the impact of training services on business performance is the random assignment of training services across firms. In practice, random assignment of training services among survey respondents might have failed, either because it has not been initially successfully implemented among all participants (these included 1325 businesses, 430 responding and 895 not responding to the follow-up survey), or if there is sample selection arising from non-response that is correlated with the provision of training, or both.

In order to test whether training services were randomly assigned, we estimated linear probability models, separately for each baseline characteristic, of whether a business was assigned or not a given training service including as explanatory variables region dummies and dummies for the baseline characteristic[2] (these estimation results are available by the authors on

request). We found no systematic difference between treatment and control groups in terms of baseline characteristics within a given region. In some cases we found weakly significant differences between treatment and control groups in the distribution of baseline characteristics that can arise from chance factors. However, controlling for these characteristics in the estimation can deal with any bias in the estimated impact of the intervention on business outcomes arising from chance differences at baseline (Duflo et al. 2007)[3].

The impact of each training service on business performance outcomes was estimated using the following specification:

$$y_{it} = \beta_0 + \beta_1 T_{i,ES,t-1} + \beta_2 T_{i,MS,t-1} + \beta_3 T_{i,HRMS,t-1} + \boldsymbol{\beta_4' X_{i,t-1}} + u_{it} \quad (1)$$

where y_{it} is an outcome for business i observed at time t, that is the timing of the follow-up survey, $T_{i,ES,t-1}$, $T_{i,MS,t-1}$, and $T_{i,HRMS,t-1}$ are dummies that take the value one if business i received the "employees' training", the "managers' training", and the "HRM training" service respectively at baseline respectively, and are zero otherwise, $X_{i,t-1}$ is a vector including all business characteristics observed at baseline, and $\beta_1, \beta_2, \beta_3$ are parameters, whereas β_4 is a vector of coefficients.

Under random assignment of training support, training dummies are expected to be uncorrelated with the error term in (1), and OLS is expected to yield unbiased estimates of the impact of each training service on business outcomes. Moreover, under the maintained assumptions, OLS identifies the average treatment effect on the treated (ATT), that is the average effect on the subpopulation of businesses that are self-selected into treatment (treatment here refers to program participation and not training provision). Under heterogeneous treatment effects, the

ATT is different than the average treatment effect (ATE) that is the average impact of the treatment on businesses of a certain type as if they were randomly assigned to it (Blundell & Costa Dias 2009). Thus, in our case OLS identifies the impact of training services on businesses in the sector that would be willing to take up fully subsidised training. Provided that these businesses have the highest actual gains from training, this impact is expected to be higher than the impact of training on the average SME in the sector. Moreover, from a policy point of view the effect of interest is the ATT, as the assignment of businesses into treatment under the ATT more closely resembles the actual policy take-up.

Table 2 presents estimation results from two specifications for log sales revenue per employee and profit margin (profit as a share of sales revenue), two well-established measures of labour productivity and profitability in the literature (Huselid 1995).

Insert Table 2 about here

Estimation results suggest that the "employees' training" has a sizeable positive and statistically significant impact on both log sales revenue and profit margin. In particular, our estimates suggest that two years after the completion of the "employees' training" service, businesses that received the service had on average 87 per cent higher sales revenue per employee and 18 percent higher profit margin than businesses that didn't receive the service.[4] Moreover, we find that, businesses that received the "managers' training" service had, on average 24 per cent higher profit margin two years after the completion of the service, as compared to businesses that didn't receive the service, but these differences are weakly significant. Estimates in table 2 also suggest

that neither the "managers' training" service nor the "HRM training" service had a significant impact on business profitability, and that the latter service had also no impact on labour productivity. We also find that, compared to businesses that didn't receive any service, businesses that received at least one of the training services had on average 72 and 22 percent higher sales revenue per employee and profit margin respectively (with differences in profit margins being weakly significant).

We also estimated specifications including interactions of the training services to test for complementarities between training services but we found no significant effects. The lack of significance of the coefficients of the interaction terms may not necessarily imply that there are no complementarities, as it may be due to low statistical power, given the size of the sample.

6. Discussion and Conclusions

One of the most important gaps in the HRM and economics literature is the lack of robust evidence on the causal impact of training on firm performance. The few existing experimental studies that address this gap provide evidence of the impact of managers' training on the performance of SMEs in developing countries. Moreover, there are no experimental studies of that kind in developed countries and no study, to date, that has purported to identify separately the impact of managers' and non-managerial employees' training on firm performance.

In this paper, we address these gaps in the literature by investigating the impact of a policy intervention that randomly assigned free general training services for managers and for non-managerial employees on the performance of SMEs in the UK accommodation and food service sector. The randomized natural experimental design allowed us to identify the average effect of training on treated firms.

We found that non-managerial employees' training had a large positive impact on labour productivity and profitability, whereas there was a weak or no effect of managerial and HRM training services on firm performance. Our results for employee training may reflect a tendency for managers in treated firms to over-report performance in order to justify the receipt of free training (Bruhn et al. 2012), although our results of a weak or no effect of managerial and HRM training on firm performance lead us to think that this is unlikely.

By construction our estimate of the average treatment effect on the treated reflects the overall or net effect of the training intervention on firm performance that combines the effects operating through all possible adjustments or channels. Although the net effect of training on performance is positive, it is possible that some of these adjustments lead to a reduction in performance. For example, additional exploratory analysis revealed that both employee and manager training had a negative effect on a measure of expenditures on external business support (including training), which suggests that the former partly substitutes for the latter.

It is also possible that firms that volunteer for a free training program are also the most constrained in their ability to invest in employee training and those likely to benefit the most by these services. Although we are unable to address this possibility, this would mean that our estimates of the impact of employee training exaggerate the impact of training on the average SME in the sector and thus can explain the large effect of employee training on performance in our study.

Finally, we cannot be certain as to why employee training seems to have stronger implications for performance than managerial or HRM training. But this finding is consistent with the argument that employee skill are greater than managerial skill shortages, and hence the contribution of employee training to performance may be greater than that of managerial and

HRM training. This argument could thus account for the larger effect of employees' training compared to managers' training on labour productivity. Businesses in this sector may also have more labour market (monopsony) power over employees than over managers (Manning, 2003) and thus are able to capture higher profits from employee training. This could explain the larger impact of employee training compared to manager training on firm profitability.

Overall, the large impact of training on performance of these businesses is consistent with earlier studies that find substantial returns to the firm from the training of employees (Blundell et al. 1999; Bartel 2000; Bruhn et al. 2012).

Our study provides rare evidence that could inform the current hot debate on the potential importance of public industrial policies and the types of public policies that are more likely to bear positive economic outcomes (Warwick, 2013). In particular, it provides support for training support policies to SMEs that are targeted in terms of the sector and firm size, but otherwise horizontal to all targeted firms.

Notes

[1]According to the OECD formal training has the following characteristics: a) employees are taught skills or given information to help them do their job better, b) it is planned in advance, c) it has a structured format and a defined curriculum (OECD 2002).

[2]In particular, if D, Y, and R are binary variables with D taking the value 1 if the business has received a given training service and 0 otherwise, Y taking the value 1 if the business has a given characteristic and 0 otherwise, and R taking the value 1 if the business is located in a given region and 0 otherwise, then $P(D=1|Y,R)=\alpha+\beta YR$ (Angrist & Pischke, 2009). Assuming that, conditional on region, the probability that a given training service is assigned to a firm of a given characteristic does not vary with region, we have that $P(D=1|Y,R)=\alpha+\gamma Y+\delta R$, and $P(D=1|Y=1,R)-P(D=1|Y=0,R)=\gamma$ (Angrist & Pischke 2009). One can show that if $\gamma=0$ then $P(Y=1|D=1,R)-P(Y=1|D=0,R)=0$, that is a necessary condition for randomisation, conditional on region, to be valid. In particular, using the fact that under random assignment of training conditional on region, $P(D=1|R)=P(D=0|R)$ and $P(Y=1|D=1,R)=P(Y=1|D=0,R)$, we have that $P(D=1|Y=1,R)-P(D=1|Y=0,R)=\frac{P(D=1|R)}{P(Y=1|R)}$ $[P(Y=1|D=1,R)-P(Y=1|D=0,R)]$, suggesting that provided that $P(D=1|R)\neq 0$ and $P(Y=1|R)\neq 0$ if $[P(D=1|Y=1,R)-P(D=0|Y=1,R)]=\gamma=0$ then $P(Y=1|D=1,R)-P(Y=1|D=0,R)=0$. Therefore, a test for the validity of random assignment of training, conditional on region can be implemented by estimating $P(D=1|Y,R)=\alpha+\gamma Y+\delta R$ and testing the hypothesis that $\gamma=0$, separately for all baseline characteristics.

[3] We have also failed to find evidence of systematic differences at baseline between businesses receiving and not receiving each training service in the sample of all 1325 businesses and evidence that survey non-response was correlated with training provision. Results are available on request.

[4]Because the dependent variable is in logs and the "treatment" variable is binary the difference in the outcome between businesses received and those not received the service in percentage terms is equal to $(e^{\beta}-1)*100$, where β is the coefficient of the "treatment" variable.

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Tables

Table 1: Descriptive Statistics for Baseline Characteristics and Post-Intervention Business Outcomes for Businesses Responded in the Follow-Up Survey

Baseline characteristics		Business Outcomes in the Follow-Up Survey	
Less than 100 employees	0.85 (0.35)	Sales revenue (£000)	2172.86 (4091.75)
Hotels, restaurants, bar, and pubs	0.53 (0.50)	Number of Employees	54 (105.13)
Limited company	0.51 (0.50)	Sales revenue per employee (£000)	88.15 (232.89)
Urban	0.37 (0.48)	Profit Margin	0.22 (0.96)
Number of observations	430		430

Notes: Statistics reported include shares of firms with a given characteristic for baseline characteristics and averages for business outcome in the follow-up survey. Standard deviations in parentheses. Except of hotels, restaurants, bars, and pubs, 47% of businesses in our sample include attractions, contract catering, caravan/home sales, and other serviced accommodation. Except of limited companies, 49% of businesses in our sample are partnerships and sole proprietorships.

Table 2: OLS Estimates of the Impact of Training Services on Business Outcomes

	Log Sales per Employee		Profit Margin	
	(1)	(2)	(1)	(2)
Employees' Training Service	0.630***		0.177**	
	(0.105)		(0.074)	
Managers' Training Service	0.221*		0.095	
	(0.119)		(0.106)	
HRM Training Service	0.149		0.102	
	(0.130)		(0.067)	
At least one training service		0.544***		0.242*
		(0.107)		(0.132)
R-squared	0.190	0.135	0.067	0.065
Number of Observations	430	430	430	430

Notes: Standard errors in parentheses. All specifications include controls for region, number of employees, industry, ownership type and location at baseline. *p-value<0.10, **p-value<0.05, ***p-value<0.01.